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FERNS OF THE PACIFIC COAST

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Ferns have attracted the attention of lovers of nature from time immemorial, since their gracefulness, delicacy, and varied forms place them among the loveliest of plants. The literature of the day is full of allusions to them. In the homes they are most eagerly sought, and are used in an infinite variety of ways. It is, therefore, not surprising that people turn to these beautiful plants to learn their names and study their needs.

BEAUTY AND VARIETY OF FORM.

Ferns form a distinctive and attractive group of plants. They are familiar to all observers of natural objects from the beauty of their ample foliage, which is most commonly plume-like in form, of a fresh and vivid green hue, or cut into small leaflets or lobes. These, on close observation, are seen to be marked on the surface, or lightly sculptured, or embossed with delicate veining.

Ferns exhibit all the grace and beauty resulting from finely-divided foliage, the various tints of green which rest the eye, the rich browns as an artistic contrast, and further contrasts of large, coarse-growing forms, to enhance the beauties of the more delicate and filmy species.

Some resemble blades of grass, from which they can with difficulty be distinguished; others, creeping, unambitious vines, which carpet the soil in the shade of the forest trees, or cover the rough surface of the rocks with a tapestry of nature's weaving.

The Gleichenias (pronounced Gleichenias) climb over rocky surfaces, and among shrubs and undergrowth, supporting and protecting with their wiry stems the more fragile and delicate ferns and flowering plants from injuries which might otherwise be in-

flicted upon them by the movement of animals, and by other causes.

Others more ambitious, climb among and over the shrubs and forest trees; while many of the smaller and more delicate species vie with the orchids in their endeavors to hide the rough bark and unsightly appearance of the fallen and decaying giants of the forest; and the tree ferns share with the palms in adding to the beauty and character of the scenery of the tropics.

They vary in size from species in which an entire plant may be covered by a silver dime, to the tall, palm-like, arborescent species which support their crowns of feathery fronds at a height of fifty or sixty feet.

WHERE TO FIND THEM.

It is generally supposed that ferns are restricted to shady, moist places, such as woodland streams, shady banks, and dense, moist forests. While this is in a measure true, we find that they thrive under almost as many and varied conditions as do flowering plants. People, while in search of rest and amusement, seek such conditions as do the ferns most often found and best known.

The warm, humid atmosphere of islands, like the West Indies, the Hawaiian group, and the South Sea Islands, seems peculiarly adapted to the best development of ferns, the conditions being somewhat of the nature of the atmospheric condition of the Carboniferous Period of the world's geological history. Tropical regions where not too arid, produce ferns in the greatest profusion.

Different genera of ferns require different conditions to enable them to thrive; some, like our Woodwardias, grow in or near running streams, while Pellaeas are often found at their best

on sunny hill slopes, among rocks.

The Cheilanthes and Notholaenas grow at higher altitudes than most of our native species, but generally in the shade of rocks or trees, or in crevices.

The filmy Adiantums grow best under the spray of falling water.

Polypodiums prefer to grow on the trunks and limbs of trees, or on rocks, where there is sufficient moisture in the atmosphere.

Some prefer the shady barrens of pine forests, notably the *Schizaea pusilla* of New Jersey, while others, such as Aspidiums and Aspleniums, require the damp, rich humus under stately trees of the forests.

Acrostichum aureum and some other ferns grow like reeds or bamboo in marshy swamps.

The *Vittaria* makes its home in the tops of the Palmetto trees, and resembles a bunch of grass more than a fern.

Lygdiums, or climbing ferns, require rich, damp soil, or moist, decayed logs, which they cover with their dainty sprays, or, climbing the tallest trees in the forest, clothe them with a net work of lace-like foliage.

In the island of Jamaica and similar localities, many ferns are epiphytal, attaching themselves to the surface or bark of the trunk and branches of forest trees, covering them with a mantle of living green.

The most curious of all is the "Floating Fern" (*Ceratopteris thalictroides*), which requires no soil, no anchorage, but simply floats upon the surface of streams and quiet pools in southern Florida, and other tropical countries. It is singular in another respect, being one of the very few ferns that are annuals; the other annuals are *Gymnogramme chaerophylla* and *G. leptophylla*.

The nobility and stateliness of the fern family culminates in the tree fern, whose magnificent crowns are reared aloft on their straight, slender stems, which, being of a fibrous character and easily penetrated by the roots of other plants, becomes the homes of many delicate species of the

smaller ferns, selaginellas, orchids, etc.

In fact, there is scarcely a place from which ferns are entirely excluded. In the far north, and on lofty mountains above the limit of forests, the delicate *Cystopteris*, the firmer *Polypodiums*, the *Aspidiums* peep from the rocks, or wave over Alpine rivulets.

The woods, ravines, and rocky ledges of our eastern states are full of their beautiful forms. From the rocks hang graceful *Adiantums*, *Cheilanthes*, and *Aspleniums*; while along the water courses and shady ravines are multitudes of *Adiantums*, *Pteris*, *Woodwardias*, *Camptosorus*, *Osmundas*, *Onocleas*, and *Aspleniums*.

On the Pacific Coast, especially in Southern California, many of the species and some of the genera common to other portions of North America are absent, as our well-defined dry season does not suit the moisture-loving species which grow in such luxuriance in more humid regions. The larger number of species of *Cheilanthes*, *Pellaeas*, and *Notholaenas*, several of which extend through Mexico, and some to South America, are perhaps more interesting to the fern-lover than are the coarser and more rampant-growing ferns of more northerly regions.

THE PACIFIC COAST.

The remarkable extent of the coast line of the United States on the Pacific, extending as it does from latitude $32\frac{1}{2}$ degrees, to 72 degrees north, and between longitude 40 degrees and 187 degrees west from Washington, including all the coast from the semi-tropic region of northern Mexico to the extreme limit of Alaska, gives us a range of extremely varied climatic conditions, and numerous zones of animal and vegetable life; in consequence of which, our fern flora partakes of the characteristics of many widely separated regions.

Many of the ferns of the southwest are really Mexican species which lap over and intermingle with those of more temperate and northern species. Several species of *Cheilan-*

thes and Notholaenas are found in Southern California, Arizona and New Mexico, but disappear with more or less rapidity as we leave the Mexican border.

Occasionally patches of these southern species are found at widely separated localities, often at high altitudes, and their distribution is such as to give rise to the question, Are these species in process of evolution or of extinction?

But the comparatively recent appearance of man on the earth, and the still shorter time during which he has made a study of these subjects, is entirely insufficient to enable us to answer the question with any degree of satisfaction.

One of our Polypodiums (*P. Scouleri*) has been noted from Marin county, north of San Francisco, which is perhaps its northern limit; next, in San Francisco county, near the ocean; again, on an outlying islet in San Luis Obispo county; and further south, on one of the Channel islands off Santa Barbara, from which locality it skips to Guadalupe Island, off the coast of Mexico. It does not appear to have been found at any distance from the ocean. Is it the remnant of a species which formerly occupied a larger extent of country and is approaching extinction? or has it been recently evolved, to become, in time, more generally distributed? Or is it a stray, or survival of the fern flora of territory which formerly existed to the westward of the present coast line? All of these theories have been advanced, but which, if any of them, is the correct answer to the question?

Nephrodium patens, found in Santa Barbara county, is found in Texas and Florida. Several others of our ferns present equally interesting illustrations of the peculiarities of distribution.

Some of our species are restricted to California, and more of them to California and Oregon, and to California and Arizona, but as we go north we find the species of the eastern states overlapping and intermingling with the ferns of the Pacific Coast, until we

reach a region where the ferns common to Canada and the northern states predominate.

One marked departure from the general rule in relation to the disappearance of the Cheilanthes in the north, is shown by *Cheilanthes argentea*, which is found in, and restricted to, Alaska; *Botrychium boreale* is another species which is restricted to the same territory.

The Pacific fern flora represents a portion of the Nearctic realm, a term applied to the portion of North America lying north of Mexico. This realm is divided into five provinces, called Boreal, Medial, Occidental, Arizonan, and Austral. Each of these provinces possesses species peculiar to itself, but the limits are by no means sharply defined, for some of the species will pass beyond the limit, yet the majority found in one province are different from those in the others. This rule does not apply to the species which are cosmopolitan in their character.

Three of the above named provinces, namely the Arizonian, Occidental, and Boreal, are represented on the Pacific Coast.

Of the political divisions of our coast line, California and Alaska alone appear to possess species peculiar to the territory lying within their boundaries. It is probable that when the large extent of territory forming the northwestern portion of the United States is more thoroughly explored, many new species will be discovered, and the known habitat of many others largely extended.

THE UTILITY OF FERNS.

For decorative purposes ferns stand unrivalled, their graceful and delicate fronds causing them to be appreciated by all lovers of the beautiful. For the embellishment of the conservatory, dinner table, ball room, or the home, ferns present a beauty of outline which is never tiresome. For bouquets in connection with flowers they are indispensable. *Woodwardia radicans*, which in some parts of California has fronds more than ten feet in height, is unrivalled for the decoration

of walls and other purposes.

The first use to which nature put the ferns appears to have been the conservation of the superabundance of poisonous carbon dioxid from the atmosphere, thus gradually preparing it to sustain animal life, which was evolved at a later period.

This carbon thus taken from the atmosphere and assimilated by the ferns and other cryptogams, was deposited in solid form and afterward covered and stored in nature's laboratory, where it was eventually changed to coal, petroleum, and other carbonaceous substances. From this storehouse, after the lapse of millions of years, it is being exhumed by civilized man, to supply the heat, light, and motive power necessary for his comfort.

Man uses ferns for various economical purposes. The pith of *Cyanochea medularis* (a tree fern) is used by the New Zealanders as food.

The stipes (stems) of *Pteris esculetana* and *Callipteris esculetana*, and the tuberous roots of *Nephrolepis tuberosa*, have been used for food. *Asplenium filixmas*, *Ceterach officinarum*, *Scolopendrium*, and many others have been used medicinally. The styptic drugs brought from Sumatra under the names of Penghawa Djambi and Pakoe Kidang, are supposed to be products of ferns. The tomentum of the "Pulu plant" (*Cibotium*) used in California and Australia, when feathers were not obtainable, to stuff pillows, cushions and mattresses, is no longer used, it being an unsatisfactory substitute for feathers.

Gleichenia dichotoma is used by the negroes of Brazil for making pipe-stems. *Angiopteris* and *Polypodium phymatodes* are used by the natives of the South Sea Islands in the preparation of cocoanut oil.

The rhizomes of several species of ferns furnish food to the natives of Australia.

The medicinal qualities of some of the *Adiantums* have been highly extolled and recommended for the relief of persons suffering from pulmonary diseases, and in Mexico tea made

from the *Adiantum tricolepis* is prescribed for chills and fever, under the name of "Silantrillo de pozo."

Woodwardia radicans was used by the Indians of California for the treatment of bruises; it was used as an infusion taken internally; they called it "Golpe." The Spaniards learned its use from the Indians, and called it "Yerba Golpe." In Southern California the aborigines used *Aspidium rigidum argutum* for medicinal purposes, and the stipes of the *Adiantum* in their basket work.

In Europe and other countries ferns are more generally utilized for various purposes than they are in the United States.

The true ferns of North America, north of Mexico, number about one hundred and fifty. Of these, fifty are found in California. Among them are eight *Pellaeas*, eight *Aspidiums*, five *Polypodiums*, five or more *Notholaeinas*, three *Adiantums*, and eight or more *Cheilanthes*, besides *Cryptogramme*, *Lomaria*, *Woodwardia*, *Aspleniums*, *Phegopteris*, *Woodsia*, together with numerous varieties of the species of the above named genera, and species of the genera *Ophioglossum*, and *Botrichium*, belonging to the *Ophioglossaceae*.

In Oregon and the regions further north there are perhaps fewer species. Those are more prolific, and consequently their presence is more noticeable. The real number of species can not be determined with certainty until the flora of those regions has been more thoroughly studied.

DANGER OF EXTINCTION.

It is much to be regretted that many of our choicest ferns are in danger of extermination from the recklessness or thoughtlessness of persons who seem to have an insatiate desire to pull up or destroy everything that is beautiful or rare. Picnic and camping parties will load up their vehicles with the delicate ferns and flowering plants, to be thrown away as soon as they begin to fade.

Our school children should be taught to preserve, instead of destroying, our ferns, flowers and birds.